REPLY

The Examiner rejected claims 1-38 under 35 USC §112, second paragraph, as being indefinite. The Examiner indicated that in claim 1, the phrase "two or more VCSEL element" renders the claim indefinite. Claim 1 does not contain the phrase "two or more VCSEL element", therefore, claim 1 is believed to be definite.

Regarding claims 21 and 22, the Examiner indicated that the phrase "polarization-stable VCSEL device" renders the claim indefinite. Claims 21 and 22 have been amended to recite limitations that result in a "polarization-stable VCSEL device", therefore claims 21 and 22 are sufficiently definite.

The Examiner also indicated that, regarding claims 39 and 44 the phrase "a phase coupling region" renders the claim indefinite. Claim 39 has been amended to more specifically define the structure of the "phase coupling region" and should now be sufficiently definite. Claim 44 is a method claim and does not contain the phrase "a phase coupling region" and therefore is definite.

The Examiner rejected claims 1-33 and 39-44 under 35 USC §102(b) as being anticipated by Jewell et al.

The Examiner rejected claims 34-38 as being unpatentable over Jewell et al.

Jewell et al discloses a VCSEL having lateral anisotropy in order to control the polarization of the emitted beam of light. Anisotropy is introduced into the optical cavity or the active layer so as to control the polarization of the beam of light emitted by the laser. Anisotropy may be introduced by a material that is birefringent. The presence of pressure, electric field, or light intensity can thus cause materials to exhibit anisotropic optical properties such as birefringence and therefore, when present in a VCSEL structure, cause the emitted beam to be polarized. Jewell et al also discloses narrow trenches as an anisotropic structure.

Claim 1 has been amended to recite symmetrical VCSEL elements in combination with a laterally patterned reflectivity. Support for these amendments can be found on page 18, line 4 and page 18, lines 16-19 of the specification. Claim 1 has also been amended to recite injecting current within a range assuring a single mood of operation. Support for this amendment can be found on page 3, lines 2-3 of the specification.

Claim 21 and 22 have been similarly amended.

Claim 39 has been amended to recite a phase coupling region having a laterally patterned reflectivity so as to couple phases of said plurality of vertical cavity surface emitting laser elements. Support for this can be found on page 5, lines 8-18 and page 15, lines 13-15. Specifically, the theory of operation of

the phase coupling is indicated on page 5, lines 12-18. It should now be sufficiently clear what the phase coupling region is and how the phase coupling is believed to work.

New claims 45-46 have been added. Claim 45 recites a first reflectivity and a second reflectivity having a reflectivity difference between 1 and 15 percent. Support for this range of reflectivity difference can be found on page 15, lines 13-15 of the specification.

Claims 47 and 48 have been added. Claims 47 and 48 conform to claims based upon which a corresponding European patent is intended to be granted. Support for claims 47 and 48 is unambiguously derivable from, for example, page 3, at the start of the first paragraph, page 17, beginning of the third paragraph, and page 18, line 4.

The present invention as claims is not anticipated or obvious in view of the references cited by the Examiner, and in particular Jewell et al. Jewell et all teaches an anisotropic structure 69 or 72 comprising narrow "trenches" etched into top surface 37 to control the polarization of the emitted beam. *Jewell et al, column 8, line 6-23.* Therefore, Jewell et al does not disclose a phase coupling region having a reflectivity difference as recited in the claims of the present invention. Jewell et al also does not provide any motivation to try a reflectivity difference as disclosed and recited in the claims to

result in substantially constant operation reducing the probability of polarization flips. Jewell el al does not address the problem of polarization flips, but only the need for polarization control. Jewell et al actually teaches away from the present invention in indicating that to control polarization in an array, all beams will propagate through an optical system with nominally identical transmission/reflection characteristics. *Jewell et al, column 8, line 23-30.*

Additionally, claim 1 recites a symmetrical structure in combination with a laterally patterned reflectivity to provide stabilized polarization, whereas Jewell et al teaches an anisotropic structure.

Claims 21 and 21 recite a phase coupling region comprising a reflectivity difference adjusted by a phase-matching layer. Such a phase-matching layer for obtaining a reflectivity differences in not disclosed in Jewell et al.

Claim 45 recites a reflectivity difference between 1 and 15 percent, that is not disclosed in Jewell et al, and cannot be considered obvious in view thereof, because there is no motivation, and the Examiner has not presented any reasoning as to why such a range of reflectivity differences would be tried.

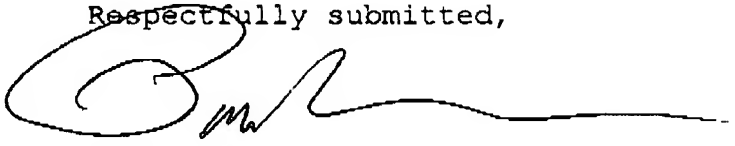
Claims 1, 21, 22, 47, and 48 additionally recite that the invention exhibits a substantially equal probability for radiating in one of two linear polarization states. That is the

VCSEL devices are specified as being symmetrical devices with respect to the independent polarization states.

The inventors of the present invention have quite unexpectedly discovered that the invention as disclosed in the application and recited in the claims results in operation of a VCSEL device that is substantially devoid of problematic polarization flips during operation in a single mode.

Accordingly, it is respectfully requested that the Examiner reconsider the present application and indicate allowable subject matter.

Respectfully submitted,



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